

## REMARKS

The Office Action mailed May 11, 2005, has been carefully reviewed and the foregoing amendment and following remarks have been made in consequence thereof.

Claims 1-4, 6-7, and 9-12, are now pending in this application. Claims 5, 8, and 13-19 are canceled. Claims 1-4, 6-7, and 9-12, are rejected.

The objection to Claim 4 is respectfully traversed. Applicants' remarks in the Office Action response dated April 18, 2005 included a typographical error in that Claim 4 was not canceled in that response, but rather it was Claim 5 that was canceled. The canceled claims were correctly listed in paragraph two of page four of the response. The canceled claims were incorrect as listed in paragraph three of page four of the response. For at least the reasons set forth above, Applicants respectfully request that the objection to Claim 4 be withdrawn.

The rejection of Claims 1-4, 6-7, and 9-12 under 35 U.S.C. § 112, first paragraph is respectfully traversed.

Applicants respectfully submit that Claims 1-4, 6-7, and 9-12 satisfy the requirements of Section 112, first paragraph. Specifically, Applicants respectfully submit that the stiffness multiplier is determined and not created as asserted in the Office Action. More specifically, Applicants respectfully submit that the specification clearly describes the subject matter in the claims with respect to "determining a stiffness multiplier" as recited in the claims. Specifically, the specification recites in part that:

[i]nstead of modeling shrouded bellows 12 (shown in Figures 1 and 2) as spring elements including an assigned spring constant that is based on static stiffness component test data, shrouded bellows 12 is characterized using a standard geometry element that includes an assigned stiffness multiplier based on dynamic stiffness component test data. The stiffness multiplier is a finite element input that may be selectively adjusted to customize a dynamic stiffness of a particular shrouded bellows element. The stiffness multiplier is determined 120 with a

regression equation that accounts for tube sub-system diameter 37 and 38, system operating pressure, bellows pitch 80, and dynamic system operating inputs. The regression equation is based on dynamic stiffness test data obtained as a result of testing several different shrouded bellows configurations. Each different shrouded bellows configuration can be analytically modeled to determine a unique stiffness multiplier for that specific shrouded bellows configuration and to generate a tube sub-system analytical model. (emphasis added)

Specification, page 4, line 21-page 5, line 5. The specification clearly describes that the stiffness multiplier is determined by testing several different bellows configurations and using the dynamic system test data in a regression equation.

Moreover, the specification describes that the method can be practiced on a computer, such as a personal computer or a workstation, including an interface, such as a keyboard and an a display, a processor, and a memory. Applicants also traverse the assertion in the Office Action that an arithmetic proof is required to describe the invention. As is known, the patentee is not required to include in the specification information readily understood by practitioners, lest every patent be written as a comprehensive tutorial and treatise for the generalist, instead of a concise statement for persons in the field. Accordingly, Applicants respectfully submit that the specification contains a written description of the invention, and of the manner and process of making and using it, to enable any person skilled in the art to make and use the same.

For at least the reasons set forth above, Applicants respectfully request that the Section 112 first paragraph rejection of Claims 1-19 be withdrawn.

The rejection of Claims 1-4, 6-7, and 9-12 under 35 U.S.C. § 101 as directed to non-statutory subject matter is respectfully traversed.

Claim 1 recites “[a] computer-implemented method for predicting natural frequency responses.” It is submitted that a computer-implemented method for predicting natural frequency responses cannot be performed in the mind of a user or by use of pencil and paper.

As such, Applicants respectfully submit that Claim 1 is directed to a practical application in the technological arts.

Dependent Claims 2-4 and 6 depend from independent Claim 1, and these dependent Claims are submitted to satisfy the requirements of Section 101 for the same reasons set forth above with respect to independent Claim 1.

Claim 7 recites “[a] modeling system for determining natural frequency response of shrouded bellows components” wherein the system includes “a processor.” It is submitted that a modeling system for determining natural frequency response of shrouded bellows components that includes a processor is directed to a practical application in the technological arts.

Dependent Claims 9-12 depend from independent Claim 7, and these dependent Claims are submitted to satisfy the requirements of Section 101 for the same reasons set forth above with respect to independent Claim 7.

Moreover, the specification describes an exemplary analytical approach to determining flexibility factors, of which stiffness multiplier is one wherein:

a three inch diameter shrouded bellows centered on a twelve inch cantilevered straight tube section (not shown) within a system pressurized to approximately 100 psia in an approximately constant 2g vibratory environment, produced a natural frequency response of 166 Hz. The test component was modeled using finite element analysis to determine that assigning a flexibility factor of approximately 0.328, enabled the analytical model to yield the same natural frequency response as the component test piece under the approximate same operating conditions.

Specification, page 5, lines 18-25. Similarly as described above, the patentee is not required to include in the specification information readily understood by practitioners, lest every patent be written as a comprehensive tutorial and treatise for the generalist, instead of a concise statement for persons in the field. Furthermore, the specification is not required to

provide an arithmetic or equivalent software process for a particular solution to determining a stiffness multiplier. The particular arithmetic or software solution is not claimed and the method includes steps that collect data from a dynamic stiffness test, which does not lend itself to an arithmetic or software process. For the reasons set forth above, Applicants respectfully request that the Section 101 rejections of Claims 1-4, 6-7, and 9-12 be withdrawn.

The rejection of Claims 1-4, 6-7, and 9-12 under 35 U.S.C. § 103 as being unpatentable over Rosemount Inc. (Technical Data Sheet “Pressure Fundamentals and Transmitter Selection” 1998) “Rosemount”, in view of Broman, et al. (“Modeling Flexible Bellows by Standard Beam Finite Elements” 1999) is respectfully traversed.

Rosemount describes the fundamentals of pressure measurement and also describes factors that should be considered when selecting a pressure transmitter for use inside a pressure transducer. Specifically, Rosemount describes an equation that is useful in identifying the natural frequency response of a flat diaphragm. While Rosemount does state that a bellows assembly may be used to “convert applied pressures into displacement”, The bellows described in Rosemount are used in pressure measurement devices and do not include a fluid flow through the device. Rosemount describes considerations for selecting components of a static pressure measuring device but, does not describe a bellows designed to join two components in a fluid flow system. As such, the natural frequency responses of a pressure measurement device and flow through device would be different with respect to each other. For example, pressure fluctuation in a pressure measurement device is due to system fluctuations transmitted to the pressure measurement device through sensing lines. System flow does not flow through the pressure measurement device. In contrast to the pressure measurement device, the flow through bellows carries system flow and is exposed to system flow fluctuations. Applicants respectfully submit that the bellows described by Rosemount is useful to convert applied pressures into displacement, whereas in contrast to Rosemount, Broman et al. describe a bellows in an exhaust system that is modeled based on system flow through and system pressure within the bellows assembly.

Broman et al. describe a method of modeling flexible metal bellows by the existing beam element formulation of the computation software I-DEAS Master Series 6. Notably, Broman et al. do not describe or suggest a method of modeling a shrouded bellows assembly.

More specifically, Broman et al. describe modeling the bellows by beam elements. Further, Broman et al. describes determining axial stiffness by modeling the bellows as an equivalent pipe and a uniform rod, determining a bending stiffness of the bellows by modeling it as a beam with the bending stiffness expressed in terms of the axial stiffness, and determining a torsional stiffness of the bellows by modeling the bellows as a pipe, but Broman et al. does not describe nor suggest determining a stiffness multiplier within each of the shrouded bellows components using a regression technique based on dynamic stiffness test data. Accordingly, Applicants respectfully submit that the method described by Broman et al. uses beam elements to model a simple bellows.

Moreover, Applicants respectfully submit that the Section 103 rejection of the presently pending claims is not a proper rejection. Obviousness cannot be established by merely suggesting that it would have been an obvious to one of ordinary skill in the art to modify Rosemount in view of Broman, et al. More specifically, as is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. Neither Rosemount nor Broman, et al., considered alone or in combination, describes or suggests the claimed combination.

Furthermore, and in contrast to the assertion within the Office Action, Applicants respectfully submit that it would not be obvious to one skilled in the art to combine Rosemount with Broman, et al. because there is no motivation to combine the references suggested in the art. Rather, the Examiner has not pointed to any prior art that teaches or suggests to combine the disclosures, other than Applicants' own teaching. Only the conclusory statement that "it would have been advantageous to model the whole exhaust system, which encompasses, axial bending and torsion characteristics of the bellows itself, as well as interaction with the rest of the system" suggests combining the disclosures. However, as described previously herein, Rosemount does not describe a bellows that carries system flow but is rather, dead ended in the pressure measurement device and Broman et al. describe modeling a non-shrouded bellows using beam elements.

Therefore, it is respectfully submitted that a prima facie case of obviousness has not been established. As explained by the Federal Circuit, "to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation,

suggestion or teaching of the desirability of making the specific combination that was made by the applicant.” In re Kotzab, 54 USPQ2d 1308, 1316 (Fed. Cir. 2000). MPEP 2143.01.

Moreover, the Federal Circuit has determined that:

[I]t is impermissible to use the claimed invention as an instruction manual or “template” to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that “[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.”

In re Fitch, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992). Further, under Section 103, “it is impermissible . . . to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art.” In re Wesslau, 147 USPQ 391, 393 (CCPA 1965). Rather, there must be some suggestion, outside of Applicants’ disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicants’ disclosure. In re Vaeck, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991).

Applicants therefore submit that the present Section 103 rejection is improper, as the rejection is merely based on a combination of teachings selected in an attempt to deprecate the claimed invention. More specifically, Rosemount is merely cited for describing that a bellows assembly can be utilized in a pressure transducer to convert external pressure into a displacement measurable by capacitive means, and Broman, et al. is cited for describing modeling of flexible car exhaust bellows using beam elements.

Since there is no teaching nor suggestion in the cited art for the claimed combination, the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicants request that the Section 103 rejection of Claims 1-4, 6-7, and 9-12 be withdrawn.

Moreover, Claim 1 recites a computer-implemented method for predicting natural frequency responses wherein the method includes “providing at least one tube sub-system including a plurality of shrouded bellows components...determining a stiffness multiplier within each of the shrouded bellows components using a regression technique based on

dynamic stiffness test data...inputting the determined stiffness multiplier into a computer model that applies a standard geometry element and a flexibility factor based upon the stiffness multiplier to predict a natural frequency response...and determining locations for duct supports based on the natural frequency response.”

Neither Rosemount nor Broman et al., alone or in combination describe the method recited in Claim 1. Specifically, Rosemount describes a bellows used in a pressure measurement device having no flow therethrough and Broman et al. describe, in contrast to the recited claim, modeling a non-shrouded bellows using beam elements. For at least the reasons set forth above, Claim 1 is submitted to be patentable over Rosemount in view of Broman, et al.

Claims 2-4 and 6 depend from Claim 1. When the recitations of Claims 2-4 and 6 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 2-4 and 6 likewise are patentable over Rosemount in view of Broman, et al.

Claim 7 recites a modeling system for determining natural frequency response of shrouded bellows components, said system comprising a processor configured to “determine a stiffness multiplier within the shrouded bellows components using a regression technique based on dynamic stiffness test data...use the determined stiffness multiplier in a model that applies a standard geometry element and a flexibility factor based upon the stiffness multiplier to predict a natural frequency response of the bellows...and determine a location of a duct support based on the natural frequency response.”

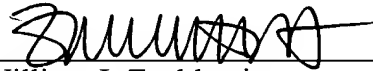
Neither Rosemount nor Broman et al., alone or in combination describe the modeling system recited in Claim 7. Specifically, Rosemount describes a bellows used in a pressure measurement device having no flow therethrough and Broman et al. describe, in contrast to the recited claim, modeling a non-shrouded bellows using beam elements, but neither Rosemount nor Broman et al., alone or in combination describe a system configured to determine a stiffness multiplier within the shrouded bellows components using a regression technique based on dynamic stiffness test data. For at least the reasons set forth above, Claim 7 is submitted to be patentable over Rosemount in view of Broman, et al.

Claims 9-12 depend from Claim 7. When the recitations of Claims 9-12 are considered in combination with the recitations of Claim 7, Applicants submit that dependent Claims 9-12 likewise are patentable over Rosemount in view of Broman, et al.

For at least the reasons above, Applicants respectfully request the 103 rejection of Claims 1-4, 6-7, and 9-12 be withdrawn.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,



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